CONSOLIDATED IRRIGATION DISTRICT

PROPOSITION 13 AGRICULTURAL WATER CONSERVATION FEASIBILITY STUDY GRANT APPLICATION

TURNOUT METERING

Consolidated Water Use Efficiency
2002 PSP

California Department of Water Resources

February 2002

Application Number	Application for (a-urban, b-agriculture, c-DWR/WUE:
442	b) Prop 13 Agricultural Water Conservation

Principle Applicant(Organization/Affiliation)
Consolidated Irrigation District
Project Title
Turnout Metering

First Name-Authorized	**Last Name (AA):**	Title
Eugene J.	Branch	

Street Address	PO Box
2255 Chandler St.	209
City	State
Selma	Ca.
Zip Code	Telephone Number(Include Area Code)
93662	(559) 896-1660
Fax Number (Include Area Code)	E-mail Address
(559) 896-8488	Geneb012000@yahoo.com

First Name-Contact Per	**Last Name-CP:**	Contact-Title

Contact-Street Address	Contact-PO Box
Contact-City	Contact-State
Contact-Zip Code	Contact-Phone Number
Contact-Fax Number	Contact-E-Mail Address

Funds Requested (dollar amount	Applicant Funds Pledged (dollar amount	Total Project Costs (dollar amou
$95,000.00	$0.00	$95,000.00

Estimated Total Quantifiable Project Benefits (dollar amount	Percentage of Benefits to be Accrued by App
$0.00	0
Percentage of Benefits to be Accrued by CALFED or othe	Estimated Annual Water to be Saved (acre-fe
0	
Estimated Total Amount of Water to be Saved (acre-fee	Over _____ Number of Years

Estimated Benefits to be Realized (terms of water qual,instream

Duration of Project (month/year-month/year):	State-Wide
10/02-09/03	☐

State Assembly District-location of project(	29	State Senate District-location of project(1	14
State Assembly District-location of project(	30	State Senate District-location of project(2	16
State Assembly District-location of project(	31	State Senate District-location of project(3	
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State Assembly District-location of project(		State Senate District-location of project(9	
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Congressional District(s)-location of project	20	Congressional District(s)-location of project(	
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County-location of project	Most recent Urban Water Mgt Plan Submitt
Fresno, Kings, Tulare	

Type Applicant-Urban(a)Agricl Feas Study(b) Gra	DWR WUE Projects	Project Focus
e) other-subdivision of state(include public water)		a) Agricultural

Project Type:

b) Implement. of Agric. efficient Water Mgt Pract

Quantifable Objectives

Specify from choice (d) above

Specify from (k) above

Does Proposal involve change in land use (planned/future)ICheck box if yes

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APPENDIX A

PROPOSAL PART TWO

Project Summary

Consolidated Irrigation District (CID) is located in the San Joaquin Valley, on the eastern side of Fresno County and in portions of Kings and Tulare Counties. The attached Figure 1 is a map of the District. CID is comprised of approximately 140,000 acres of land. Approximately 92,000 acres are capable of receiving surface water through the District's diversion from the Kings River. CID's average annual surface water irrigation deliveries are approximately 280,000 acre feet.

CID's water delivery system is comprised of approximately 350 miles of open channels, which include constructed ditches and channelized natural drains and sloughs. There are also numerous lateral pipelines and piped portions of the main channels. Typical District turnouts include a canal gate installed in a pipe stand (control stand) with an inlet from the canal and an outlet connected to the user's private irrigation system. Turnout deliveries are estimated by District ditch tenders who adjust the canal gate for the desired flow.

For reasons that will be noted later in the application, CID wishes to implement volumetric water measurement at their turnouts. Some users have multiple delivery points so it is difficult to determine the exact number of turnouts within the District, but it has been estimated at 4,000 to 5,000. A number of metering options, including various electronic devices, have been investigated. The most practical and economic solution appears to be mechanical propeller meters installed at an appropriate location in the turnouts.

Two options, each of which are detailed in the attached Figures 2 and 3, have been proposed for implementing propeller meters at turnouts. Although these options have been selected to minimize costs, implementing meters for 4,000 to 5,000 turnouts will be a significant undertaking. To identify issues that might be encountered during construction and operation of metered turnouts, a feasibility study is proposed in which

a relatively small number of selected turnouts (10 or less) are modified, used and evaluated during a water run. The study will serve a number of useful purposes. It will provide an indication of what the actual water deliveries are versus what is currently being estimated by ditch tenders. The District will be able to accurately determine the costs associated with modifying the turnouts and purchasing meters and extrapolate those costs over the entire District. Construction and operations difficulties will be identified. Meter reading, record keeping, and eventual billing procedures will be developed. The feasibility of utilizing propeller meters will be determined (i.e. Will the aquatic weeds and trash typically present in the District's water system prevent the meters from operating properly and will the removal of the meters and frequency of cleaning the propellers be practical?).

The expected outcome of the study is that installation and operation of the meters will be feasible but capital costs to implement meters throughout the District will be prohibitive without a funding source other than District reserves and revenue. It is also anticipated that actual deliveries will be greater than what is currently being estimated, indicating the potential for reduced deliveries and greater efficiency. The cost to perform the feasibility study, including purchase of meters and modification of turnouts, is estimated to be $95,000.

A. Scope of Work: Relevance and Importance

CID proposes to conduct a feasibility study in which a small number of District turnouts (10 or less) are modified and retrofitted with mechanical propeller meters. The purposes of the study are to determine the disparity between actual water deliveries and the deliveries currently estimated by District ditch tenders; to identify construction and operations costs and the difficulties associated with implementing a District-wide metering program; to develop meter reading, recording and eventual billing procedures; and to determine the feasibility of using propeller meters in the District's turnouts.

In addition to CID's desire to promote efficient water management practices, one of the driving factors in proposing water meters at each turnout is the District's need to increase its revenue within the constraints of the Proposition 218 legislation regarding tax increases. Currently CID places annual assessments on its users which are based on the user's land acreage and type of irrigation water service. Users who receive surface water from the District's delivery system receive a higher assessment than users who only pump groundwater. Groundwater users are assessed for the benefits provided by the District's extensive groundwater recharge program. Implementing meters at each surface water user's turnout would allow the District to continue acreage based assessments and in addition, volumetric charges for the actual amount of water delivered. It is also anticipated that a volumetric charge would promote more efficient irrigation practices and ultimately conserve water.

B. Scope of Work: Technical/Scientific Merit, Monitoring and Assessment, and Feasibility

Technical/Scientific Merit

The control stands used at the District's turnouts are typically located at the top of the canal bank so the length of the inlet pipe is very short and in some cases there is simply a hole in the side of the control stand for water to enter the turnout. Two options have been proposed for implementing propeller meters at turnouts, both of which will require partially modifying the turnout facilities to allow the meters to perform correctly. Figures 2 and 3, which are attached to the application, indicate the proposed configuration and required modifications for implementing propeller meters at CID's turnouts. The first option is to mount open flow propeller meters in existing control stands with the propellers pointed upstream into the inlet. Propeller meter manufacturer's recommend there be five to ten pipe diameters of straight pipe ahead of the meter. Since this length of straight pipe is generally not available at CID's turnouts, the inlets must be modified by rotating the pipe alinement downstream in the canal enough to provide the required pipe length. Pointing the inlet pipes downstream versus upstream was elected to minimize the amount of aquatic weeds and trash that enter the turnout. In cases where the control stand diameter is not much larger than the canal gate size, there may not be room to rotate the inlet far enough and the control stand will have to be replaced with a larger diameter stand. The second option will be used in some instances to avoid replacing the existing control stands. This option utilizes an in-line propeller meter which is mounted to the underground outlet pipe by use of a saddle. To provide below ground access to the saddle meter for taking readings, cleaning and performing maintenance, a well must be provided over the outlet pipeline.

Monitoring and Assessment

As the above described modifications are made to the turnouts, the costs will be documented and any difficulties with the proposed configuration and construction will be noted. During the period when the District runs water through its system and the metered users take surface water deliveries, the ditch tenders will be instructed to set

the canal gates for the same delivery they have estimated in past years. In addition to these typical activities they will be instructed to make daily records from the meter of the instantaneous flow and the volume delivered since the previous reading. Notes will also be documented regarding the cleaning frequency of the propellers, the change in flow indicated by the meter following cleaning and the practicality of removing and replacing the meters for cleaning. When it is practicable, a portable electronic current meter will be used to assess the accuracy of the propeller meters after they are installed in the turnouts. This is done by observing the recorded volume through the propeller meter over a set time when the flow through the turnout is in a steady state. Then the propeller meter is removed from the turnout and the current meter is inserted in the same location and flow readings are taken. For saddle meter installations, it may be possible to utilize the current meter upstream of the canal gate to compare with the saddle meter. This opportunity will be assessed case by case and in keeping with good stream gauging practices. Administrative exercises will be carried out for processing the meter data and preparing hypothetical billing statements. These exercises will be used to gauge the additional administrative effort that will be needed if meters are implemented for the entire District. All of the field notations, meter data and administrative processes will then be summarized and assessed in a report used to determine the feasibility of implementing District-wide metering. As a part of the study, funding sources for District-wide metering will also be examined.

Table 1 on the following page indicates the time line and estimated expenditures set forth for the feasibility study. Invoicing for expenses would be submitted quarterly together with a brief written progress report of the work completed. The final report summarizing all the data collected and making a determination of the feasibility of District-wide turnout metering would be submitted with the final invoice. If only partial grant funding is awarded, the scope of the study will be scaled down by reducing the number of turnouts that are modified. Since there are many variations of turnout configurations throughout the District, reducing the number included in the pilot study will reduce the opportunity to identify construction and operations issues and to some degree will reduce the overall value of the study.

Table 1
Task Schedule and Quarterly Expenditures

Item No.	Task	2002			2003									Task Cost
		Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	
1	Select Turnouts to be Modified													$1,000
2	Modify Turnout Facilities and Install Meters													$60,000
3	Document Construction Issues													$3,000
4	Operate Turnouts During Water Run													$3,000
5	Document Operations & Meter Records, Verify Meter Accuracy													$6,000
6	Develop Billing Process													$4,000
7	Summarize Data													$6,000
8	Investigate Funding Options													$1,500
9	Prepare Report													$10,500
	Quarterly Expenditure	$33,000			$31,000			$8,000			$23,000			$95,000

Feasibility

The information gathered through the course of the turnout metering pilot study will be summarized and assessed. Feasibility of District-wide metering will be dependent on the effort required and the success of modifying and operating the selected turnouts. Procedures for reading the meters, documenting the readings, and processing the readings for billing are not anticipated to be determining factors of feasibility. Practice of these activities will be used to determine the overall costs to the District associated with operating metered turnouts. The key issues will be the difficulty and cost to modify the turnouts, the relative accuracy of the propeller meters once they are installed in the District's turnouts, and how often aquatic weeds and trash must be manually removed from the propellers. If little of the existing turnout facilities can be used in implementing the meters or if floating aquatics must be removed from the propellers several times per day, other options will most likely be explored.

C. Qualifications of the Applicants and Cooperators.

CID's General Manager will be designated as the Project Manager of the feasibility study. The General Manager's resume is attached as Appendix A. The construction activities necessary to modify the turnouts will be performed by a General Contractor working closely with District staff to insure the goals of the study are maintained. District staff will control the turnout gates to make deliveries to the water users as they would with any other turnout. They will be instructed how to read the meters, record the readings, clean the meters and document operational issues with the meters and the turnouts through the course of the water run. Summers Engineering, Inc. (SEI), the District's engineer, has prepared the turnout modification drawings that will be used by the Contractor and will provide limited construction inspection. SEI will provide recommendations for the data collection and record keeping to be performed by the District. SEI will provide support to District staff for current metering activities to verify the accuracy of the propeller meters. SEI will compile the data, prepare a final report, make a determination of feasibility and investigate funding sources for District-wide metering. SEI will also provide written progress reports to the District and aid in the processing of invoices for quarterly submittals to the State.

D. Benefits and Costs.

1. Budget Breakdown and Justification.

The following Table 2 is a break down of the budget set forth to perform the turnout metering feasibility study.

Table 2
Budget Breakdown

Item	Description	Unit Price	Units	Quan.	Amount
a.	**Labor and Salaries**				
a.1.	Select Turnouts	$250	per day	1	$250
a.2.	Modify Turnout Facilities and Install Meters	$250	per day	14	$3,500
a.3.	Document Construction Issues	$250	per day	6	$1,500
a.4.	Operate Turnouts During Water Run	$250	per day	12	$3,000
a.5.	Document Operations & Meter Records	$250	per day	12	$3,000
a.6.	Develop Billing Process	$250	per day	10	$2,500
c.	**Benefits**	(included in Salaries)			
d.	**Travel**	N/A			
e.	**Supplies and Expendables**	(included in Services and Consultants)			
f.	**Services and Consultants**				
f.1.	Select Turnouts	$750	per day	1	$750
f.2.	Modify Turnout Facilities and Install Meters	$750	per day	2	$1,500
f.3.	Document Construction Issues	$750	per day	2	$1,500
f.5.	Document Operations & Meter Records	$750	per day	4	$3,000
f.6.	Develop Billing Process	$750	per day	2	$1,500
f.7.	Summarize Data	$750	per day	8	$6,000
f.8.	Investigate Funding Options	$750	per day	2	$1,500
f.9.	Prepare Report	$750	per day	14	$10,500
g.	**Equipment (Purchase Meters)**				
g.2.	Modify Turnout Facilities and Install Meters	$2,000	each	10	$20,000
h.	**Other Direct Costs (General Contractor)**				
h.2.	Modify Turnout Facilities and Install Meters	$3,500	each	10	$35,000
i.	**Indirect Costs**	(included in Labor and Salaries, Services and Consultants)			
Total					**$95,000**

Applicable items from the Table 1 Task Schedule are listed under each budget category together with the unit price of the budget item, the estimated time or quantity to complete the task and the extended amount. The labor and salary category is broken down to the various tasks that would be performed all or in part by District employees. The rates include salary plus benefits and overhead. Travel within the District would all be considered local and is therefore not an applicable charge. Supplies and

expendables are not anticipated to be significant and will be covered in the rates for Services and Consultants. Summers Engineering will have varied levels of involvement for nearly all tasks and therefore charges for Services and Consultants are included for a portion of all tasks except operation of the turnouts, which will be performed entirely by District personnel. The single item under the Equipment category is the direct purchase of the propeller meters by the District. The single item under the Other Direct Costs category is the estimated amount per turnout for a general contractor to perform the necessary modifications to the District's existing facilities. As noted previously, Indirect Costs for items such as District or Consultant overhead are included in the rates for those categories. The total estimated cost to perform the turnout metering feasibility study, including piloting of ten (or fewer) metered turnouts, is $95,000.

2. Cost-Sharing.

No cost sharing is proposed for the turnout metering feasibility study.

3. Benefit Summary and Breakdown.

A primary benefit that will be provided as a result of the turnout metering feasibility study is an indication of the potential water savings that would occur with District-wide metering. By making water deliveries in the same manner as has been done historically by the District's ditch tenders and concurrently keeping records of the actual deliveries indicated by the meters, a correlation will be developed for the potential improvements in irrigation efficiency and the subsequent District-wide water savings. Specific costs will be determined for modifying the turnouts and then operating them while keeping meter records. This information will provide the basis for determining the total cost and economic feasibility to implement a District-wide metering program. Other more qualitative information gained will include a determination of the cleaning frequency required for operating propeller meters in the District's water system, identification of construction difficulties in modifying the turnouts, determination of the relative accuracy provided by propeller meters being used in the proposed configurations, and identification of funding options available to the District.

The information provided by the proposed turnout metering feasibility study is needed for the District to consider implementing a District-wide metering program. The estimated cost of $95,000 to perform the feasibility study is a relatively small fraction of the total cost that will be expended if 4,000 to 5,000 meters are implemented in the District. However, the information provided will be key to the success of an eventual project.

E. Outreach, Community Involvement and Acceptance

Informal inquiries by the District have indicated that there will be resistance to turnout metering by the District's surface water users. For the District to comply with the requirements of Proposition 218, they will need to conduct public hearings that provide an opportunity for users to voice their opinions and/or protest the use of water meters. The District will inform users of the benefits of water meters to gain wide spread support for the project.